

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY (Chapter I of the Patent Cooperation Treaty)

(PCT Rule 44bis)

Applicant's or agent's file reference P03/272-Dr.Derow/NK	FOR FURTHER ACTION	See item 4 below
International application No. PCT/GB2004/004534	International filing date (<i>day/month/year</i>) 28 October 2004 (28.10.2004)	Priority date (<i>day/month/year</i>) 30 October 2003 (30.10.2003)
International Patent Classification (8th edition unless older edition indicated) See relevant information in Form PCT/ISA/237		
Applicant MERCK PATENT GMBH		

1. This international preliminary report on patentability (Chapter I) is issued by the International Bureau on behalf of the International Searching Authority under Rule 44 *bis*.1(a).
2. This REPORT consists of a total of 8 sheets, including this cover sheet.

In the attached sheets, any reference to the written opinion of the International Searching Authority should be read as a reference to the international preliminary report on patentability (Chapter I) instead.

3. This report contains indications relating to the following items:

<input checked="" type="checkbox"/> Box No. I	Basis of the report
<input checked="" type="checkbox"/> Box No. II	Priority
<input type="checkbox"/> Box No. III	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
<input type="checkbox"/> Box No. IV	Lack of unity of invention
<input checked="" type="checkbox"/> Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
<input type="checkbox"/> Box No. VI	Certain documents cited
<input type="checkbox"/> Box No. VII	Certain defects in the international application
<input checked="" type="checkbox"/> Box No. VIII	Certain observations on the international application
4. The International Bureau will communicate this report to designated Offices in accordance with Rules 44bis.3(c) and 93bis.1 but not, except where the applicant makes an express request under Article 23(2), before the expiration of 30 months from the priority date (Rule 44bis .2).

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland Facsimile No. +41 22 740 14 35	Date of issuance of this report 01 May 2006 (01.05.2006) Authorized officer <p style="text-align: center; font-weight: bold;">Dorothee Mülhausen</p> Telephone No. +41 22 338 87 40
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PATENT COOPERATION TREATY

REC'D 04 FEB 2005

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From the
INTERNATIONAL SEARCHING AUTHORITY

PCT

To:

see form PCT/ISA/220

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY (PCT Rule 43bis.1)

Date of mailing
(day/month/year) see form PCT/ISA/210 (second sheet)

Applicant's or agent's file reference
see form PCT/ISA/220

FOR FURTHER ACTION
See paragraph 2 below

International application No.
PCT/GB2004/004534

International filing date (day/month/year)
28.10.2004

Priority date (day/month/year)
30.10.2003

International Patent Classification (IPC) or both national classification and IPC
H01L51/30

Applicant
AVECIA LIMITED

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☒ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, Inventive step and Industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☒ Box No. VIII Certain observations on the international application

2. FURTHER ACTION

If a demand for international preliminary examination is made, this opinion will usually be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA"). However, this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of three months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

Name and mailing address of the ISA:



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**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.
PCT/GB2004/004534

Box No. I Basis of the opinion

1. With regard to the **language**, this opinion has been established on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.
☐ This opinion has been established on the basis of a translation from the original language into the following language , which is the language of a translation furnished for the purposes of international search (under Rules 12.3 and 23.1(b)).
2. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:
 - a. type of material:
☐ a sequence listing
☐ table(s) related to the sequence listing
 - b. format of material:
☐ in written format
☐ in computer readable form
 - c. time of filing/furnishing:
☐ contained in the international application as filed.
☐ filed together with the international application in computer readable form.
☐ furnished subsequently to this Authority for the purposes of search.
3. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.
4. Additional comments:

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.
PCT/GB2004/004534

Box No. II Priority

1. ☒ The following document has not been furnished:

☒ copy of the earlier application whose priority has been claimed (Rule 43*bis*.1 and 66.7(a)).

☐ translation of the earlier application whose priority has been claimed (Rule 43*bis*.1 and 66.7(b)).

Consequently it has not been possible to consider the validity of the priority claim. This opinion has nevertheless been established on the assumption that the relevant date is the claimed priority date.

2. ☐ This opinion has been established as if no priority had been claimed due to the fact that the priority claim has been found invalid (Rules 43*bis*.1 and 64.1). Thus for the purposes of this opinion, the international filing date indicated above is considered to be the relevant date.

3. ☐ It has not been possible to consider the validity of the priority claim because a copy of the priority document was not available to the ISA at the time that the search was conducted (Rule 17.1). This opinion has nevertheless been established on the assumption that the relevant date is the claimed priority date.

4. Additional observations, if necessary:

Box No. V Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	9,13,14
	No: Claims	1-8,10-12,15,16
Inventive step (IS)	Yes: Claims	
	No: Claims	1-16
Industrial applicability (IA)	Yes: Claims	1-16
	No: Claims	

2. Citations and explanations

see separate sheet

Box No. VIII Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

see separate sheet

Re Item V.

1. Clarity

The **application does not comply with Article 6 PCT** because the following claims are not clear.

1.1

Claims 1, 12 and 15 do not clearly define the subject-matter for which protection is sought. The claims attempt to define the subject-matter in terms of the **result to be achieved**, which merely amounts to a statement of the underlying problem, without providing the technical features necessary for achieving this result.

Claim 1: "... a substance which results in a Tg of the resulting mixture which prior to cross-linking is lower than that of the said semiconducting material ..."

Claim 12: "... which results in a Tg of the resulting mixture which is lower than ..."

Claim 15: "... semiconducting layer is substantially insoluble in the solvent ..."

1.2

Moreover, **claims 1, 2 and 12** define their subject-matter using the parameter Tg. The definition of a product solely by its parameters is only allowed in exceptional circumstances (see Guideline 5.36) where it is not possible to define the product in another way.

However, this does not appear to be the case here. The product could be more adequately characterized by specifying the group of linkable substances used as plasticizers (i.e. small oxetane units containing molecules), which achieve the desired effect "to optimise the cross-linking" (page 2 line 30). In fact, the definition of "the substance" to be added to the semiconducting material solely by its Tg lowering effect is **not supported by the description**. Adding any substance (e.g. an organic solvent), which is capable to reduce the mixture's Tg, will not result in the object of the present application, namely the optimization of the cross linking (see Guidelines 5.44). This effect is clearly attributable to the cross-linking capability of the plasticizer added.

1.3

Furthermore, **Tg is an unusual parameter** not commonly used in the field of organic electronic devices to characterize mixtures at the moment or shortly before they are spin-coated. Many prior-art documents are silent on this parameter. Consequently, this parameter might have been introduced in order to disguise novelty (see Guidelines 5.36). However, **lack of novelty can be considered to be implicit** due to a disclosure of a prior-art document where the same group of compounds are used as in the current application

(see Guidelines 12.04).

1.4

Claim 2 contains the phrase "**near**" ("... a temperature near to the resulting Tg ..."). This **term is vague** and does not allow to clearly distinguish between a process falling under the scope of the claim and a process not falling under it.

1.5

Claims 7, 9, 13 and 14 contain alternative technical features with the adverbs "preferably" and "more preferably". It is not clear what the actual scope is for which protection is sought. For assessing novelty and inventive step (Art. 33(1-3)) the least restrictive wording was observed.

2. Documents

1 The following documents are referred to in this communication:

D1 : WO 02/21611 A (KANITZ ANDREAS ; ROGLER WOLFGANG (DE); SIEMENS AG (DE)) 14 March 2002 (2002-03-14)

3. Novelty and Inventive Step (Article 33(1-3))

3.1 Independent Claim 1

The present application does not meet the criteria of Article 33(1) PCT, because the subject-matter of **claim 1 is not new** in the sense of Article 33(2) PCT.

D1 discloses (the references in parenthesis applying to this document):

- the preparation of a spin-on solution (p. 33 "Beispiel 28") by mixing an oxetane functionalized hole transporting π -conjugated triarylamine polymer (p. 33 lines 1-17 compound VII) with an oxetane cross-linkable solvent ("vernetzbares Lösungsmittel", p. 30 line "Beispiel 26") and adding a photoinitiator (p.33 line 27)
- spin coating an ITO substrate
- cross-linking the layer using UV light (p. 34 first paragraph)

Since in the process according to D1 the **same type of compounds** are used as in the

current application, it is assumed that the same technical effect is achieved as claimed in claim 1, namely the lowering of T_g (see also paragraph 1.3 above), and that the process **falls inevitable under the scope of claim 1.**

Although D1 describes the removal of the **oxetane cross-linkable solvent** before cross-linking the layer (p. 34 line 34), it is outlined on page 15 line 35 - page 16 line 6 that the cross-linkable solvent is chosen deliberately because residual solvent will remain in the dried polymer layer and **participate in the cross-linking reaction, even further increasing the degree of cross-linking.** Thus, the skilled person will in order to increase the degree of cross-linking increase the amount of oxetane cross-linkable solvent in the layer before cross-linking. He will do this without inventive skill.

The disclosure of D1 differs to the subject-matter of claim 1 in that in D1 a **hole-transporting material is used** instead of a semiconducting material. However, it is generally known in the art that triarylaminines, as used in D1 and the current application, often have both properties, namely being hole-conducting and semiconducting, the former property being promotable by simply doping the substance. Therefore, it can be expected that the hole-conducting compounds disclosed in D1 are also semiconducting rendering the subject-matter of **claim 1 not novel.**

Even if that would not be the case, the skilled person would not limit the teaching of D1 to only **hole-conducting substances** because the substances described in the current application are very similar to those of D1 and secondly, because D1 describes throughout the description that its disclosure can also be used for semiconducting materials (see D1 p. 1 first paragraph). Consequently, then the subject-matter of **claim 1 would not be inventive.**

3.2 Dependent Claims 2-15

The additional features of **claims 2-9, 10-12, 14, 15 are either not novel** (disclosed in D1) **or not inventive**, as discussed above under 3.1.

The additional technical feature of **claim 9** of specifying the conjugated units of the semiconducting polymer is a trivial selection out of commonly chosen ranges. This feature was selected without inventive skill. The same is true for the selection of the ratio of oxetane units to monomeric units as described in **claim 13.**

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING
AUTHORITY (SEPARATE SHEET)**

International application No.

PCT/GB2004/004534

3.3 Independent Claim 16

The subject-matter of **claim 16** is disclosed in D1 (p. 33 "Beispiel 28") and therefore **not new**.

Re Item VIII.

see Item V